Unraveling the impact of complex walking and dual-tasking on gait, energy expenditure, and perceived exertion in healthy young adults

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Résumé

Abstract

Introduction As it involves navigating irregular terrains or obstacles, complex walking requires greater cognitive and energetic resources compared to simple walking. When a cognitive task is added, creating a dual-task condition, cognitive-motor interference can occur, potentially impairing stability and walking performance, and may influence energy costs. This study investigates the combined effects of complex walking and dual-task conditions on gait parameters, energetic cost, and perceived exertion in healthy young adults.

Methods
Thirty-one healthy young adults, aged 22.4 ± 1.3 years, walked along a corridor for four minutes in four walking conditions: simple walking, simple dual-task walking , complex walking, and complex dual-task walking . Walking speed and cadence, as calculated by the intelligent insole Podosmart®, oxygen consumption and energy cost, measured via oxygen consumption using the Metamax 3B, and perceived exertion, assessed with the Borg scale, were evaluated.

Results
Complex walking significantly reduced walking speed ($p < 0.001$) and increased energetic cost ($p < 0.001$) compared to simple walking. Adding a cognitive task further reduced walking speed ($p < 0.001$) but unexpectedly decreased energetic cost ($p < 0.001$). Perceived exertion was highest in the condition combining complex dual-task walking ($p < 0.05$). Notwithstanding these subjective reports, there was no significant interaction between complex walking and dual-task conditions for gait parameters or energetic cost ($p > 0.05$). These results highlight the independent contributions of motor and cognitive demands.

*Intervenant

Discussion

The findings demonstrate that while complex walking and dual-task conditions independently affect locomotor performance and energetic cost, their combination creates a significant subjective burden. This dissociation between measured performance and perceived exertion underscores the difficulty of simultaneously managing physical and cognitive tasks.

This study emphasizes the distinct challenges posed by complex walking and dual-task scenarios, thereby providing valuable insights in the perspective of rehabilitation.

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